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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/522,688	08/04/2005	Patrick Choquet	Q86074	1679

23373 7590 08/19/2008

SUGHRUE MION, PLLC
2100 PENNSYLVANIA AVENUE, N.W.
SUITE 800
WASHINGTON, DC 20037

EXAMINER	
SHEVIN, MARK L	
ART UNIT	**PAPER NUMBER**
1793	
MAIL DATE	**DELIVERY MODE**
08/19/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/522,688	Applicant(s) CHOQUET ET AL.	
	Examiner Mark L. Shevin	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _20 May 2008_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-26_ is/are pending in the application.

4a) Of the above claim(s) _6-11,13,14,18 and 22-25_ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) _1-5,12,15-17,19-21 and 26_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _08/04/2005_.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. Claims 1-26, filed May 20th, 2006, are currently under examination. Claims 6-14, 18, and 22-25 are withdrawn and claim 26 is new.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. **Claims 1-5, 9, 12, 15, 17, 19-21, and 26** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Pluim** (US 6,322,859) in view of the **ASM Handbook** ("Surface Engineering of Carbon and Alloy Steels" in Vol. 5: Surface Engineering, 1994.) and **Stinnett** (WO 96/22841).

Pluim teaches a process for producing a decorative material by applying very thin layers of metal to the surface of a textured flexible substrate. The thin metal layers replicate the surface features and texture of the substrate to thereby create interesting visual effects (Abstract). Pluim teaches a process of metal vapor deposition (physical vapor deposition) using sputtering to coat the substrates and teaches metals such as stainless steel (Col. 3, lines 58-65) may be coated using sputtering. Precise control of the metal coating thickness is possible and provides aesthetic advantages in terms of interference colors and other optical effects (Col. 3, lines 15-25). Furthermore, the thickness of the coating (possibly 2500 angstroms or less) allows the metallic coating to replicate the surface patterns of the substrate (Col. 3, lines 27-32). Multiple layers of metal, applied sequentially, create interference colors and effects (Col. 4, lines 17-19).

Pluim teaches that a variety of metals may be used in the invention including aluminum and tin and that various combinations and thickness of layered metals may be used (Col. 4, lines 39-50).

The metal vapor deposition process is normally done in vacuum but can performed in the presence of other species such as nitrogen, oxygen, and sulfides where the metal vapor will of course react with the gas species to form nitrides, oxides, and sulfides respectively. These films produce a variety of colors and protect the underlying metal layers from corrosion (Col. 4, lines 1-7).

Pluim teaches the general concept of coating a substrate (flexible material may be a steel sheet such as 0.7 mm. soft steel used in the Instant Specification) with a layer of metal or metal alloy (inherently having a melting point) with a thickness of 0.25 microns (2500 angstroms) or less and also suggests second and plural additional coatings with thicknesses in the claimed range (Col. 4, lines 17-19 and Col. 3, lines 19-21). One would have a reasonable expectation of success in applying the process of Pluim to coat a rigid substrate because if the sputtered films can adhere to flexible materials, then they are surely sufficiently adherent to bond to a mechanically-simpler rigid substrate that puts less strain on the film during use.

Pluim had disclosed coating a substrate with metals including tin and aluminum but did not disclose coating a metal material such as carbon steel.

The ASM Handbook teaches on p. 3, para. 1 in its section on Tinplate, that low-carbon steel strip is often coated with tin in the thickness range of 0.38 to 1.5 microns. This material is known as tinplate and is the base material used for the vast majority of

food cans (p. 3, para. 1) and is of course designed to be corrosion resistant. The ASM handbook teaches that an extremely thin passivation film of chromium oxide is deposited on the outer surface of the tin coating (p. 3, last para.). This film further improves the corrosion resistant of the tinplate. Furthermore, it is well-known that carbon steel has little if any chromium content and thus the base iron will readily oxidize with the surrounding oxygen to form rust however tinplate on carbon steel causes the tinplated carbon steel to corrode at a slower rate than even untreated stainless steel (US 5,397,652, Col. 2, lines 6-15).

Neither Pluim nor the ASM handbook teaches an intermediate thermal processing step to bring the surface of the first layer to between $0.8T_f$ and T_f.

Stinnett is drawn to a high-speed, commercial-scale means for deposition of films and coatings on a substrate. This process allows not only deposition, but also special modes of post-deposition treatment of films and coatings, including annealing, melting, and regrowth (Abstract).

Stinnett teaches an pulsed ion beam assisted deposition, PIBAD, to apply a rapid thermal treatment to a near-surface region during and/or following a coating growth process. For metals, the primary effect is to dramatically raise the temperature of a thin surface layer (p. 9, lines 5-12). These ion beam pulses can be used to provide a rapid thermal anneal to a composite structure but should not so powerful as to melt the substrate, instead they should bring the surface of the target close to the melting point, perhaps 0.6 - 0.99 T_m (p. 10, lines 9-14). This rapid thermal treating step is suggested

to form an intermediate alloyed and densified layer between the substrate and first coating.

Stinnett teaches that in the context of improving adhesion between the substrate and coating a common procedure is to replace a single coating with a multilayer composite coating, in particular one deposits a first layer which exhibits good adhesion to the substrate, then deposits the desired layer on top of the intermediate layer, which also exhibits good adhesion to the top layer (p. 2, line 23 to p. 3, line 1).

Stinnett further teaches that the main reason for increased adhesion in multilayer adhesion is alloying of the two materials at their mutual interface. In the absence of a clear cleavage plane between the substrate and the coating stresses across the interface have no naturally place to focus, resulting in a much stronger structure (p. 2, line 25 to p. 3, line 1 and p. 3 lines 19-26).

Stinnett teaches a specific example of a metallic material with a crystallographic structure, stainless steel, being treated in this manner and that the irradiation conditions, and thus temperatures should be adjusted for each given situation (p. 10, lines 21-28). Stinnett discloses in claim 1 a method of depositing a material on a substrate producing a composite structure and then thermal treatment. Claim 5 further specifies that the thermal treatment of the composite comprises annealing without melting the thin surface layer.

Stinnett's apparatus is capable of carrying out deposition economically on a wide range of coating/substrate combinations (p. 6, lines 10-14).

Lastly, on page 17, lines 20-28 Stinnett teaches that the source of energy for the thermal treatment can be pulses of plasma (plasma discharge).

Regarding claim 1, it would have been obvious to one of ordinary skill in the metallurgical arts at the time the invention was made, given the disclosure of Pluim, ASM handbook, and Stinnett as a whole, to combine Pluim in view of ASM Handbook and Stinnett to coat a metal material with a first layer of metal having a thickness of less than 2.5 microns, rapidly heat the first layer near its melting point, and then deposit a second coating of a thickness of less than 1 micron. Motivation to combine Pluim with the ASM Handbook comes from Pluim's suggestion to use tin to coat a substrate and the common ground in the role of metal oxides in preventing corrosion.

Motivation to combine Stinnett with ASM Handbook and Pluim comes from Stinnett's suggestion that a metal coating has greater adhesion to a substrate if a first coating is treated with a rapid thermal anneal to form an intermediate layer and result in a stronger coating structure (p. 3, lines 19-26). Furthermore Stinnett taught that rapid thermal treatment affects mixing (alloying) and densification of coatings (p. 6, lines 3-7).

Motivation to coat carbon steel with tin comes from Pluim's suggestion to use thin sputtered layers of tin to coat a substrate and the ASM Handbook's teaching that carbon steel coated with tin has good corrosion resistance (commonly used in food cans). Pluim specifically taught that sputtering is effective means of coating metals such as stainless steel Col. 3, lines 58-65).

Motivation to coat the second layer on top of the treated layer comes from both Stinnett and Pluim in that Stinnett teaches that in the context of improving adhesion

between the substrate and coating a common procedure is to replace a single coating with a multilayer composite coating, in particular one deposits a first layer which exhibits good adhesion to the substrate, then deposits the desired layer on top of the intermediate layer, which also exhibits good adhesion to the top layer (p. 2, line 23 to p. 3, line 1) and Pluim teaches that multiple layers of metal, applied sequentially, create interference colors and effects (Col. 4, lines 17-19). Pluim has a similar goal with the instant application of attaining aesthetically-pleasing optical effects on the surface of an article.

Regarding claims 2 and 3, Pluim teaches that aluminum and tin can be used in his sputtering process to coat a substrate (Col. 4, lines 39-50) and that sputtering, his coating means of choice, allows the coating of metals such as stainless steel. Both tin and aluminum have melting points below 700 °C. Furthermore, the ASM Handbook taught a first coating of tin (melting point of ~232 °C -- 449 °F). Again, Pluim teaches that multiple layers of metal, applied sequentially, create interference colors and effects (Col. 4, lines 17-19) and the ASM Handbook teaches that a normal tinplate has five layers working together to affect the overall corrosion behavior (p. 4, para. 2).

Regarding claims 4, 19, and 20, the ASM Handbook teaches the addition of a chromium oxide to the outer layer of a tin-plated substrate as a passivation layer (p. 3, last para.).

Regarding claims 5 and 17, the ASM Handbook teaches tinplating a low-carbon steel and the rejection to claim 1 established why one of ordinary skill would have multiple layers.

Regarding claims 9 and 15, Pluim teaches coating a substrate with a metal using sputtering.

Regarding claim 12, Pluim teaches on p. 17, lines 22-28, that the source of energy for the rapid thermal treatment can be pulses of plasmas (plasma discharge).

Regarding claim 21, the ASM Handbook discusses the process of depositing tinplate on carbon steel as being carried out while the carbon steel substrate is in strip form (p. 3, third-to-last para.) and that the strip is weld to form a continuous strip used in a tinplate line (p. 3, second-to-last para.). Sequentially processing steps carried out on a moving strip are the conventional form of processing in coating metal materials and thus one of ordinary skill would look to this kind of processing route for the greatest efficiency.

Regarding claim 26, while none of the cited references specifically discloses a “tridimensional” or three-dimensional optical effect, one of ordinary skill would reasonably assume that by performing a very similar coating method as established by the instant rejections as discussed above, similar optical effects would logically followed from such a process. From MPEP 2112, para. V, subpara 1: "[T]he PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on 'inherency' under 35 U.S.C. 102, on '*prima facie* obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...”

Furthermore, Pluim teaches that his coating invention, when applying multiple metal layers, creates interference effects and colors (col. 4, lines 10-22). One of

ordinary skill in the metallurgical arts would know that interference effects are the phenomenon behind the most notable three-dimensional optical effect, hologram.

3. **Claim 16** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Pluim** (US 6,322,859) in view of the **ASM Handbook** ("Surface Engineering of Carbon and Alloy Steels" in Vol. 5: Surface Engineering, 1994.) and **Stinnett** (WO 96/22841) as applied to claims 1-5, 9, 12, 15, 17, and 19-21 above and in further view of **Cote** (D.R. Cote, et al. Plasma-assisted chemical vapor deposition of dielectric thin films for ULSI semiconductor circuits, *IBM Journal of Research and Development*, Vol. 43, issue ½, 1999.).

None of three main references of Pluim, ASM handbook, or Stinnett teach coating a transparent mineral film on the surface on the second coating using a reactive plasma assisted chemical vapor deposition method.

Cote reviews the use of plasma assisted chemical vapor deposition (PACVD) of thin dielectric films such as silicon oxide (Abstract). These dielectric films are often used for passivation in semiconductor circuits (Abstract). The plasma-assisted CVD processes described by Cote are known to meet the extremely demanding requirements of semiconductor manufacture such as the filling of sub-half-micron-wide gaps without voids (p. 2, para. 2, lines 1-2). Cote teaches that PACVD has moved from research and development lines to current product manufacturing lines (p. 1, para. 1) and that in recent years new materials and process requirements have made plasma-assisted deposition processes increasingly important (p. 1, para. 2). Furthermore, transparent mineral films such as silicon oxynitride are used as anti-reflective coatings

to give unique optical properties stemming from interference effects, namely destructive interference (p. 20, para. 2).

It would have been obvious to one of ordinary skill in the metallurgical arts to use the proven, high-performance deposition method of PACVD to deposit a transparent mineral film on a metal substrate as such mineral films as silicon oxide have successfully been applied to silicon (metal) substrates. As PACVD is sufficient in depositing passivating mineral films such as silicon oxide on micron-size feature in semiconductor IC settings where quality, speed, efficiency, and cost are paramount, then one would have a reasonable expectation of success in implementing PACVD to deposit a protective mineral film such as silicon oxide on the outer surface (second coating) of a tin-plating metal material. Motivation to combine Cote with the previous combination of Pluim, ASM Handbook, and Stinnett comes from the common problem of coating substrates with mineral films for passivation and/or optical effects as present in the ASM Handbook, Cote, and the instant application.

Response to Applicant's Arguments:

4. Applicant's arguments filed May 20th, 2008 have been fully considered but they are not persuasive.

Applicants assert (p. 8, para 3) that Pluim does not disclose metal as a substrate.

In response, Pluim taught a process of metal vapor deposition (physical vapor deposition) using sputtering to coat the substrates and teaches metals such as stainless steel (Col. 3, lines 58-65) may be coated using sputtering. Although metals were not specifically disclosed as a substrate material, films (which may include metals) and

flexible substrates (which may also include metals). In addition, metals coatings are taught by Pluim to protect underlying metal layers from corrosion and a metal substrate is a metal layer as such. Lastly, the rejection being traversed includes ASM Handbook, which was directed to the coating of metal substrates, in particular carbon steel.

Applicants assert (p. 8, para 5) that "based on the disclosure of the ASM handbook, one of ordinary skill in the art would not modify Pluim by using a metal substrate."

In response, Pluim taught the general concept of coating a substrate (flexible material may be a steel sheet such as 0.7 mm. soft steel used in the Instant Specification) with a layer of metal or metal alloy (inherently having a melting point) with a thickness of 0.25 microns (2500 angstroms) or less and also suggests second and plural additional coatings with thicknesses in the claimed range (Col. 4, lines 17-19 and Col. 3, lines 19-21). However, one would have a reasonable expectation of success in applying the process of Pluim to coat a rigid substrate because if the sputtered films can adhere to flexible materials, then they are surely sufficiently adherent to bond to a mechanically-simpler rigid substrate that puts less strain on the film during use. Further motivation to use a rigid substrate comes from Pluim's teachings as the aesthetic optical effects that are a result of his coating method. The Examiner fails to see how these effects would be lost by modifying the substrate to a rigid substrate.

Applicants assert (p. 9, paras 1 and 5) that the thin coatings of Pluim would not form optically tridimensional effects and that one of ordinary skill would "not have a rational reason to coat a rigid substrate of have a reasonable expectation of success."

In response, Pluim does teach that his coating invention, when applying multiple metal layers, creates interference effects and colors (col. 4, lines 10-22). One of ordinary skill in the metallurgical arts would know that interference effects are the phenomenon behind the most notable three-dimensional optical effect, hologram. The Examiner notes all claims, except for the newly added claim 26, require a three-dimensional optical effect. The rational reason to coat a rigid substrate is the desire to form aesthetically pleasing optical effects on a substrate as taught by Pluim.

Applicants assert (p. 10, paras 1-4), that Stinnett is not relevant because there is no indication of the respective thickness of the layers deposited before and after thermal treatment and thus it is impossible to know if an optical 3-D effect is obtained and that Pluim and Stinnett would not be combined to due lack of a common metal substrate.

In response, the respective thicknesses of deposited layers are not claimed features of the invention and the Examiner is thus not beholden to their immediate consideration. Motivation to combine Pluim and Stinnett comes from Stinnett's teaching regarding improves layer adhesion.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

-- Claims 1-5, 12, 15-17, 19-21, and 26 are finally rejected
-- No claims are allowed

The rejections above rely on the references for all the teachings expressed in the texts of the references and/or one of ordinary skill in the metallurgical art would have reasonably understood or implied from the texts of the references. To emphasize certain aspects of the prior art, only specific portions of the texts have been pointed out. Each reference as a whole should be reviewed in responding to the rejection, since other sections of the same reference and/or various combinations of the cited references may be relied on in future rejections in view of amendments.

All recited limitations in the instant claims have been met by the rejections as set forth above. Applicant is reminded that when amendment and/or revision is required, applicant should therefore specifically point out the support for any amendments made to the disclosure. See 37 C.F.R. § 1.121; 37 C.F.R. Part §41.37 (c)(1)(v); MPEP §714.02; and MPEP §2411.01(B).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark L. Shevin whose telephone number is (571) 270-3588 and fax number is (571) 270-4588. The examiner can normally be reached on Monday - Friday, 8:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy M. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

/Mark L. Shevin/
Examiner, Art Unit 1793
/Roy King/
Supervisory Patent Examiner, Art Unit 1793
August 10th, 2008
10/522,688